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DESCRIPTIONS OF *FINLAYA* THEOBALD, A GENUS IN TRIBE AEDINI (DIPTERA: CULICIDAE), AND ITS TYPE SPECIES *FL. KOCHI* (DÖNITZ)

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ABSTRACT. Genus *Finlaya* Theobald is characterized based on the morphology of females, female genitalia, males, male genitalia, pupae, and 4th-stage larvae. Distinctive characters of the genus are discussed and included species are listed. *Finlaya kochi*, the type species, is described in detail and a syntype female is selected as neotype. An extensive list of previous literature pertaining to the genus is provided.

KEY WORDS *Aedes*, Aedini, *Finlaya*, *Finlaya kochi*, Kochi Group, *Ochlerotatus*

INTRODUCTION

Theobald (1903) introduced and briefly described *Finlaya* for 2 species, *Fl. kochi* (Dönitz) and *Fl. poicilia* Theobald (the latter as a new species), and Blanchard (1905) designated *Fl. kochi* as the type species of the genus. Of the features mentioned by Theobald, only the following are distinctive of the genus: wings spotted with large, broad, light and dark scales; apical segments of abdomen with ventral scaly tufts; and femora with rather prominent scaly tufts. *Finlaya* (as the Kochi Group) has undergone several changes in generic-level placement, as can be seen from the list of previous usage below. Reinert (2000a) included *Finlaya* as a subgenus of *Ochlerotatus* Lynch Arribalzaga when he reorganized the composite genus *Aedes*. Recently, Reinert et al. (2004), as a result of cladistic analyses of tribe Aedini, restored *Finlaya* to generic rank for 36 species previously included in the Kochi Group. These authors proposed extensive changes to the generic classification of Aedini based on cladistic analyses of morphological data from the eggs, 4th-stage larvae, pupae, and adults of all previously recognized genera, subgenera, and major species groups of the tribe. As a result 46 genera, including *Finlaya*, are currently formally recognized, some of which are mentioned in the present paper, for example, *Downsiomyia* Vargas, *Lorrainea* Belkin, and *Stegomyia* Theobald. Because the original description of *Finlaya* by Theobald (1903) is only based on adults of 2 species, the genus and its type species are described in detail below.

Except for terms proposed by Reinert (1990, 1999, 2000b) and Reinert et al. (1997), the morphological terminology used in the descriptions follows Harbach and Knight (1980, 1982). The 2-letter abbreviation for genus *Finlaya* is *Fl.*

GENUS *FINLAYA* THEOBALD, 1903

Type species: *Culex kochi* Dönitz, 1901.
Synonyms:

Finlaya Theobald, 1903.
Popea Ludlow, 1905.

Previous usage:

Culex, of Dönitz (1901).
Culex (?), of Theobald (1901).
Finlaya, of Theobald (1907), Ludlow (1903), Blanchard (1905), Bancroft (1908), Taylor (1914), Stanton (1915), Hill (1922), Delfinado and Hardy (1971), Reinert et al. (2004).
Finlaya, in part of Theobald (1905, 1910), Banks (1906), Brunetti (1907).
Finlayia, of Giles (1904).
Popea, of Banks (1906), Ludlow (1911), Brunetti (1912).
Ochlerotatus, in part of Moulton (1914), Brunetti (1920), Senior-White (1923).
Culex (*Finlaya*), of Brunetti (1914).
Aedes (*Ochlerotatus*) Group *Finlaya*, in part of Edwards (1917).
Aedes, of Edwards (1922a), in part of Marks (1949, 1968a, 1968b), Foot and Cook (1959), van den Assem (1960), Reid (1961), Dowell et al. (1965), Stojanovich and Scott (1965, 1966), Parrish (1969), Cabrera (1970), Basio et al. (1973), Parsons et al. (1974), Pinkovsky and Sutton (1977), Cabrera and Valeza (1978), Kay et al. (1979), Marks (1980), Lang and Ramos (1981), Lee et al. (1984), Foley et al. (1992), Barker-Hudson et al. (1993), Miyagi et al. (1994), Kay et al. (1996), Russell (1996).
Aedes (*Finlaya*), in part of Dyar (1920), Edwards (1922b, 1924, 1926, 1928a, 1929, 1935), Brug and Haga (1923), Cooling (1924), Haga (1924), Brug (1926, 1931, 1934, 1939), Paine and Edwards (1929), Brug and Edwards (1931), Barraud (1934), Taylor (1934a, 1934b, 1946), Bonne-Wepster and Brug (1937, 1939), Knight

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et al. (1944), Lee (1944), Stone and Bohart (1944), Bohart (1945), Baisas (1946, 1974), Bohart and Ingram (1946), Brug and Bonne-Wepster (1947), Penn (1949), Bick (1951), Bonne-Wepster (1954a, 1954b), Komp (1954), Iyengar (1955, 1960), Horsfall (1955), Stone and Knight (1956), Macdonald (1957), Rees (1959), Stone et al. (1959), Thurman (1959, 1963), van den Assem (1959, 1961), Rageau (1960), Stone (1961, 1963, 1967), Peters (1963), Rozeboom and Cabrera (1964), van den Assem and Bonne-Wepster (1964), Army Mosquito Project (1965), Belkin (1965), Macdonald et al. (1965), Scanlon and Peyton (1965), Steffan (1966), Stone et al. (1966), Huang (1968, 1977), Sandfast and Barrow (1969), Basio (1971), Marks (1972), Stone and Delfinado (1973), van Peenen et al. (1975), Lien et al. (1977), Kurihara (1978, 1984), Arnaud (1979), White and Kurihara (1980), O'Connor and Sopa (1981), Miyagi et al. (1985), Apiwathnasorn (1986), Tsukamoto et al. (1987), Laird (1988), Lu et al. (1988), Evenhuis and Gon (1989), Harrison et al. (1990), Townsend et al. (1990), Darsie et al. (1992), Service (1993), Malhotra and Mahanta (1994), Rattanarithikul and Panthusiri (1994), Hearnden and Kay (1995), Clements (1999), Kurihara (1999), Kaur (2003).

Aedes (*Finlaya*), of Buxton and Hopkins (1925, 1927), Edwards (1928b), Paine (1943), Amos (1944, 1947), Starkey and Webb (1946), Dantis (1948), Marks (1957), Rozeboom and Cabrera (1963), Basio et al. (1970), Mattingly (1971), Ramalingam (1976), Ramalingam and Belkin (1976), Cheong et al. (1982), Samarawickrema et al. (1992).

Aedes (*Finlaya*) Kochi Group, of Edwards (1932), Stone and Bohart (1944), Knight and Laffoon (1946), Marks (1947, 1958, 1961), Knight and Marks (1952), Bohart (1957), Macdonald and Traub (1960), Belkin (1962), Peters (1963), Dobrotworsky (1965), Banez and Jueco (1966), Steffan (1970), Taylor (1972, 1973), Taylor and Tenorio (1974), Taylor and Maffi (1978), White (1979), Wilkerson and Peyton (1990).

Aedes (*Finlaya*) Group A (*kochi* group), of Bates (1949), Knight and Hull (1951), Bohart (1957).

Aedes (*Finlaya*) *kochi* complex, of Laird (1956).

Aedes (*Finlaya*) *kochi*-group, Subgroup I (*kochi*), of Kurihara (1981), Lee et al. (1982), Johansen et al. (2001).

Aedes (*Finlaya*) *albotaeniatus* group, in part of Lu and Ji (1997).

Ochlerotatus (*Finlaya*), in part of Reinert (2000a).

Ochlerotatus (*Finlaya*) Kochi Assemblage, of Reinert (2002).

Females. *Head:* Antennal pedicel with patch of small, broad, partially overlapping, pale scales and few short, fine setae mesally; maxillary palpus with at least apex pale-scaled, with 5 palpomeres, palpomere 5 very small; eyes contiguous or separated at most by less than diameter of 1 eye facet; clypeus bare; vertex with decumbent scales largely broad except for median stripe of narrow pale scales; ocular line with narrow pale scales; occiput and vertex with numerous erect, forked scales, those on vertex often semierect; proboscis relatively short (often shorter or equal to forefemur length), with pale-scaled area, usually as narrow to moderately broad band near midlength (pale areas considerably reduced in some species, e.g., *Fl. ananae* (Knight and Laffoon) and *Fl. poicilia*; greatly expanded and covering distal 0.60 or more of proboscis in some species, e.g., *Fl. fuscitarsis* (Belkin)). *Thorax:* Scutum with narrow, curved scales forming more or less defined pattern of light scales that may blend or contrast with dark scales, few species also with few broad scales on margins of prescutellar area, e.g., *Fl. schlosseri* (Belkin), setae present on following areas: anterior promontory, acrostichal (anterior and posterior), antedorsocentral, dorsocentral (anterior and posterior), scutal fossal, antealar, supraalar, posterior median scutal, prescutellar, and parascutellar; prescutellar area with pale scales on lateral and anterior margins, median area bare except for narrow transverse band near midlength; scutellum usually with broad scales only (some species also with few narrow scales on midlobe basally), each lobe with few short and long setae; mesopostnotum bare; anteprononotum with broad pale scales and several setae; prespiracular area without setae; postpronotum with large patch of broad scales and few posterior setae; postspiracular area usually without scales, rarely with scales, e.g., *Fl. burnetti* (Belkin), and with few setae; subspiracular area with upper and lower patches of broad pale scales (patches may nearly merge in few species); upper proepisternum with broad pale scales and few setae; paratergite with broad pale scales; prealar area with broad pale scales, usually both upper and lower patches, and several setae; mesokatepisternum with upper and lower patches of broad pale scales, normally 1 upper (occasionally few) and few lower setae posteriorly; mesepimeron with upper patch of broad scales and several upper setae, lower setae absent; mesomeron with dorsal margin well above base of hindcoxa. *Legs:* Fore- and midcoxae with pale-scaled upper and brown-scaled lower patches, hindcoxa with lower patch of scales; fore- and postprocoxal membranes bare; fore-, mid-, and hindfemora and -tibiae with several pale-scaled bands or spots on nearly entire length (tibiae rarely completely pale-scaled); all femora usually with conspicuous, preapical, anteroventral tuft of semierect, elongate scales most conspicuous on midfemur; fore-, mid-, and hindtarsi with pale-scaled bands or spots, tarsomere 5 entirely white-scaled, hindtarsomere 1 with pale-scaled bands at base, middle, and apex, hindtarsomere 2 (and usually 3) with apical, pale-scaled band, hindtarsomere 4 normally dark-scaled; some species with tarsi, as well as most of legs, almost complete-

ly pale-scaled, e.g., *Fl. flavipennis* Giles; fore- and midtarsi with ungues equal in size, both with tooth, hindtarsus with ungues equal in size, both simple. *Wing:* Dorsal surface with broad scales on veins forming conspicuous patterns of light and dark spots (very rarely nearly completely pale-scaled); wing fringe with pale- and dark-scaled areas; remigial setae absent; alula with row of narrow scales along posterior margin; upper calypter with numerous setae on margin. *Abdomen:* Terga of most species with conspicuous pale-scaled pattern on dark-scaled background, some species with terga mainly pale-scaled, tergum I with lateral patch of broad pale scales; sterna VI,VII, and sometimes V, with caudomedian tuft of longer semierect scales (less apparent in some species, e.g., *Fl. freycinetiae* (Laird)); segments VII and VIII laterally compressed.

Female genitalia. *Tergum VIII:* Apex broadly rounded, with several moderately long and few long setae; broad scales covering distal 0.52–0.92; setae on distal 0.24–0.73. *Sternum VIII:* Apex flat; broad scales in large lateral patches on distal 0.51–0.92; setae on distal 0.60–0.94, apical margin with numerous short, slightly curved setae (normally several lanceolate) except for 2 moderately long setae laterally on each side. *Tergum IX:* Composed of 2 long, narrow, lateral sclerites connected basally by lightly pigmented strip, apex wider than base, 1–5 (usually 2,3) setae apically on each lateral sclerite (setae absent in *Fl. knighti* (Stone and Bohart)). *Insula:* Liplike; transversely flattened; with 1–4 (usually 2,3) short setae laterally on each side of midline, 3–7 total setae. *Lower vaginal lip:* Narrow; sclerite absent. *Upper vaginal lip:* Narrow; upper vaginal sclerite large, heavily pigmented. *Postgenital lobe:* Short, apex broadly rounded; with 2–9 (usually 3–6) setae distally on each side of midline, 5–17 (usually 6–12) total setae. *Cercus:* Short; apex broadly rounded or flattened, with several short, lanceolate setae and few moderately long to long setae; dorsal surface with broad scales on distal 0.45–0.74 (few scales in some species, e.g., *Fl. burnetti* and *Fl. freycinetiae*) and setae on distal 0.27–0.78. *Spermathecal capsules:* One large and 2 medium; spherical; several spermathecal capsule pores near orifice.

Males. Generally similar to female. *Head:* Antenna plumose with setae long and directed dorsally and ventrally, distal 2 flagellomeres long, narrow, with few short setae; maxillary palpus with white-scaled areas, palpomere 1 very short, palpomeres 2 and 3 long, slender, ankylosed, with distal part of palpomere 3 somewhat swollen, slightly upturned, and with several long setae ventrolaterally, palpomeres 4 and 5 short, slender, downturned, palpomere 4 with numerous long setae ventrolaterally, palpomere 5 with few short and long setae primarily on proximal, distal, and lateral margins. *Legs:* Fore-, mid-, and hindtarsi with 2 ungues, fore- and midtarsi with ungues unequal in size, larger unguis usually with 2 teeth (some species apparently with 1 tooth, see Belkin 1962), smaller unguis with 1 tooth, hindtarsus with ungues equal in size, both simple.

Male genitalia. *Tergum IX:* Composed of 2 moderately large lateral plates separated by narrow, membranous area mesally, with 2 very small, caudally or caudomesally projected submedial lobes, each bearing 1–4 (usually 2 or 3; 0,1 in *Fl. knighti*) moderately long, slender to moderately stout, curved setae; broadly connected laterally to sternum IX. *Gonocoxite:* Moderately long; relatively narrow distally and moderately wide proximally; mesal surface membranous; numerous broad scales (in some species long and broad) on dorsal, lateral, and ventral surfaces; basomesal area of dorsal surface with dense patch of short to moderately long setae, some of which may be lanceolate, many species also with long, specialized seta projecting from tubercle on ventral part of this area (some species with this tubercle and seta absent, e.g., *Fl. knighti* and *Fl. poicilia*); sternal surface with elongate patch of long to very long, broad (somewhat narrower in some species, i.e., *Fl. fijiensis* (Marks) and *Fl. gressitti* (Bohart)), fusiform scales (scales becoming shorter proximally), on mesal margin inserted some distance from apex, some species also with short, narrow, fusiform scales or specialized setae forming elongate patch immediately dorsad of patch of long fusiform scales. *Gonostylus:* Attached at apex of gonocoxite; short to moderately long, narrow in many species, or slightly broader at midlength, or with mesal area sharply expanded subapically, e.g., *Fl. avistylus* (Brug) and *Fl. medleri* (Knight and Laffoon); normally with 1 minute seta subapically (1,2 relatively long setae subapically in *Fl. fijiensis*); gonostylar claw long, narrow, apex blunt. *Claspette:* Stem columnar, moderately long, narrow, with numerous spicules, usually with 1 short seta on distal third (3 setae in *Fl. lutea*) and 1 short seta on proximal third; apical filament long, foliform, narrow at base (about thickness of apex of stem) and becoming wider with lightly to unpigmented membranelike sheath or flap (usually annulated transversely) normally on about middle third, and narrowed to pointed apex. *Proctiger:* Paraproct moderately long; apex with 1–3 short, curved, teeth terminating in beaklike apex; normally 1,2 (3 in *Fl. lutea* (Ludlow) and 4 in *Fl. franclemonti* (Belkin)) short, cercal setae. *Phallosome:* Aedeagus short, scooplike, proximal part with sides nearly parallel, distal part greatly expanded and apex broadly rounded or with small, median emargination; paramere slightly less than or equal to aedeagal length; basal piece relatively short, narrow. *Sternum IX:* With 2,3 (usually 2) moderately long setae on posteromesal area.

Pupae. Integument with 1 and often several clear, unpigmented spots and/or larger areas (usually surrounded by heavier pigmented areas) on cephalothorax and/or abdominal terga I–IV. *Ceph-*

alothorax: Dorsal apotome composed of 2 elongate, moderately pigmented, lateral sclerites separated by narrow mesal membrane; seta 1-CT very long, stout, normally 2-branched; 2,3-CT short to moderately long, approximately equal in length, bases relatively close together; 4,5-CT moderately long, multiple-branched, 4-C slightly shorter than 5-CT; 10,12-CT branched; 11-CT single. *Trumpet:* Relatively short to moderately long; apex moderately broad to broad; tracheoid area developed on basal area. *Abdomen:* Terga III–V with abdominal puncture associated with seta 4; seta 3-I very long, single; 6-I usually single, longer than 7-I; 1-II relatively short, slender, with few to several branches; 2-II anterior and mesal (or at same level in some specimens) to 1-II; 2-VI anterior and slightly mesal or in line with 1-VI; 3-II,III long to very long, much longer than 5-II,III, stout, usually single; 5-II mesal to 4-II, slender, usually branched; 5-II,III noticeably anterior to 3-II,III; 5-IV–VI very long, stout, usually 2-branched, noticeably longer than following tergum; 6-VII short, slender, with few branches, borne near posterior margin of tergum, inserted posteromesal to 9-VII; 8-II present, short, slender, branched; 8-VII inserted laterally on tergum, displaced far anteriorly; 9-III–VI displaced anteriorly, 9-III at same level as 6-III, 9-IV–VI anterior to 6-IV–VI, 9-VI inserted anterodorsal to 8-VI; 9-VII moderately stout, displaced far anteriorly; 9-VIII multiple-branched (10 or more branches). *Paddle:* Without fringe of hairlike spicules (except *Fl. freycinetiae* with short spicules on distal part of outer margin); seta 1-Pa single, short; 2-Pa absent.

Fourth-stage larvae. *Head:* Rounded in outline; relatively small in size; seta 1-C with proximal part stout to very stout, with 2–7 (normally 2 or 3) branches; 2,3-C absent, 3-C represented in some specimens by minute spicule; 4,6-C moderately long, both usually branched, inserted far anteriorly, 4-C well developed, medial to and slightly anterior or posterior to 6-C, slightly shorter than 6-C; 5-C long, single, inserted posterior and slightly mesal to 6-C; 7-C moderately long, multiple-branched, some branches longer than others, inserted anterolateral to 5-C, anteromesal to antennal base and posterolateral to 6-C; 8,9-C slender, with few branches; 10-C slender, single; 13-C single (very rarely 2-branched in some specimens), inserted mesal to 12-C; 14-C stellate (except in *Fl. franclemonti* and *Fl. knighti*), multiple-branched (except in *Fl. franclemonti*), displaced posteriorly and at same level as or slightly posterior to 15-C; 15-C short, with slender branches; 18-C short, single; 19-C absent; labiogula short. *Mouthparts:* Seta 6-Mx multiple-branched, usually strongly developed, stellate. *Antenna:* Lightly pigmented; short; without spicules; seta 1-A single; 2-A relatively long, single, noticeably longer than 3–6-A but shorter than 1-A. *Thorax:* Seta 0-P stellate, multiple-branched, displaced laterally; 1,3-P stellate, moderately long, multiple-branched (8 or more branches), noticeable shorter than 2-P; 2-P long to very long, single; 1–3-P attached to common setal support plate; 6-P longer than 5-P; 7-P very long; 9,10-P short, stellate; 13-P absent; 1-M,T multiple-branched, normally stellate; 3-M long, single; 5-M, 10-M,T, and 12-M single; 11-M,T moderately long, branched (usually with 5 or more branches); 2-T single; 7,12-P, 5,10,12-M, and 10-T much longer than other setae; 3-T stellate, inserted anterior to 1,2,4–6-T; 5-T stellate, inserted mesally and slightly posterior to 6-T; 6-T relatively long, single; 8-T stellate, displaced anteriorly; 12-T relatively short, usually single. *Abdomen:* Numerous stellate setae (always 1,2,5,9-I–VII, 7-III–VI, 6,8,10,13-VII, 1,5-VIII, and usually 10-VI and 13-I–VII); seta 2-I–VII displaced far anterior and slightly mesal to seta 1, multiple-branched; 3-I–VI long, single; 5-I–VI moderately long, inserted noticeably anterior to seta 6; 5-III–VI anterior to 8-III–VI; 6-I,II long, aciculate, multiple-branched (4 or more branches); 7-I long, usually 0.75–0.90 length of 6-I; 7-II moderately long, usually less than 0.50 length of 6-II, usually with 2–4 (range 1–5) branches; 8-II–V moderately long (relatively long in some species), single; 9-II–VI displaced anteriorly, moderately long, multiple-branched (7 or more branches); 10-IV,V and usually 10-III, single; 12-I moderately long to long, single; 13-VI,VII displaced anteriorly, multiple-branched; 1-VII multiple-branched (5 or more branches), all or most branches moderately long, some branches may be longer; 3-VII usually single, inserted anterior to setae 1,4,5-VII; 7,12-VII single, often relatively long; 10-VII multiple-branched; segment VIII with comb of numerous (45–100, usually 60 or more) scales in patch of several rows, anterior scales short, posterior scales usually noticeably longer and often bladelike with one or few short, lateral spicules near base or with minute spicules laterally and/or apically (see Marks [1947: 3] for range of variation); 2,4-VIII single; 4-VIII inserted close to seta 3-VIII and far from seta 5-VIII; saddle incomplete ventrally, covered with short spicules (except much reduced in *Fl. freycinetiae* and apparently absent in *Fl. burnetti*), with numerous long, moderately stout spicules on ventral and caudal margins except areas near attachment of setae 1-X and 2,3-X; 1-X very long, at least 2.5× length of saddle; 4-X with 10 lightly pectinate setae attached on ventral margin of small, lightly to moderately pigmented boss, at least caudal 6 setae with long stems that terminate in 3–7 long, slender, simple branches; 4 anal papillae. *Siphon:* Acus normally absent, very rarely present and poorly developed in few specimens; siphon covered with short spicules, few species with basal margin bare (spicules apparently absent in *Fl. burnetti* and restricted to narrow distal area in *Fl. freycinetiae*); pecten with 5–15 (usually 6–10) long, slender spines with ventral fringe of fine spicules often from about proximal 0.25 to apex (restricted to distal area in some species, e.g., *Fl. ananae*); seta 2-S inserted

dorsally very close to posterior margin of siphon; 6,8-S very long, single, 8-S longer than 6-S; spiracular apodeme broad from base to about midlength then narrow to apex, usually relatively short.

Eggs. Buxton and Hopkins (1925, 1927) provided the following information about the egg of *Fl. kochi* (= *Fl. samoana* Grünberg). Eggs are black, elongate with ends tapered and bluntly rounded, length 0.69–0.79 (mean 0.74) mm, width 0.13–0.14 (mean 0.13) mm, with shallow sculpturing; laid singly in strings on base of host plant leaf above water level. Belkin (1962) believed these eggs were probably those of *Fl. oceanica* (Belkin). Lee et al. (1982) noted that eggs of *Fl. kochi* described by Buxton and Hopkins (1925) could be, in part, those of *Fl. samoana.* Cheong et al. (1982) reported *Fl. poicilia* laid batches of eggs ranging from 16 to 104 per female, with an average of 81 eggs.

Included species. *Finlaya alocasicola* (Marks)*, *Fl. ananae**, *Fl. avistylus**, *Fl. bougainvillensis* (Marks)*, *Fl. burnetti**, *Fl. crocea* (Knight and Laffoon)*, *Fl. dobrotworskyi* (Marks)*, *Fl. fijiensis**, *Fl. flavipennis**, *Fl. franclemonti**, *Fl. freycinetiae**, *Fl. fuscipalpis* (Belkin), *Fl. fuscitarsis**, *Fl. gahnicola* (Marks)*, *Fl. gressitti*, *Fl. hollingsheadi* (Belkin)*, *Fl. horotoi* (Taylor), *Fl. hui* (Bohart)*, *Fl. josephinae* (Marks)*, *Fl. knighti**, *Fl. kochi**, *Fl. lewelleni* (Starkey and Webb)*, *Fl. lutea**, *Fl. maffii* (Taylor and Tenorio), *Fl. medleri**, *Fl. neogeorgiana* (Belkin)*, *Fl. oceanica**, *Fl. poicilia**, *Fl. samoana**, *Fl. schlosseri**, *Fl. solomonis* (Stone and Bohart)*, *Fl. sorsogonensis* (Banez and Jueco)*, *Fl. stonei* (Knight and Laffoon)*, *Fl. tutuilae* (Ramalingam and Belkin)*, and *Fl. wallacei* (Edwards)*. *Finlaya gani** (Bonne-Wepster) is provisionally included in the genus (see below). Specimens of species followed by an asterisk were examined in the present study. Literature pertaining to the other species was evaluated.

Distribution. Southern Oriental Region and northern and eastern Australasian Region. Belkin (1962, Fig. 224) provided a map showing the geographical range of *Finlaya* (as Kochi Group).

Bionomics. Larvae are found almost exclusively in small collections of water in leaf axils of plants, especially species of the Pandanaceae and Araceae (Belkin 1962: 361). Belkin (1962: 361) also reported the following: ''On Guadalcanal I noted that at least 4 species of the group may be found in a single host plant [*Pandanus,* see p. 359] at the same time but that each species occurred predominantly in certain leaf axils and generally at a specific level of the tree. The immature stages are sometimes found in extremely shallow water. The larvae can crawl out of the water readily and apparently can move into a more suitable environment in nature.'' He further stated: ''The aquatic cycle is usually long, and most species are difficult to rear in the laboratory.''

Females of only a few species (e.g., *Fl. fijiensis, Fl. kochi, Fl. oceanica,* and *Fl. samoana*) are known to bite humans. They appear to be predominantly nocturnal feeders but there are some records of diurnal attacks (Belkin 1962).

Discussion. Adults of *Finlaya* are easily distinguished by the following: dorsal veins of the wing are covered with broad scales arranged in pale and dark areas (spots); the costa has 3 or more pale-scaled areas; the posterior wing fringe is dark-scaled but with pale-scaled areas at the terminus of veins; both the maxillary palpus and the proboscis have pale-scaled areas; the fore-, mid-, and hind-femora and -tibiae have several pale-scaled bands and/or spots; the fore-, mid-, and hindtarsi have extensive pale-scaled areas and hindtarsomere 5 is always white-scaled; and hindtarsomere 1 has basal, median, and apical pale-scaled bands (median band rarely reduced to a pale-scaled spot) and hindtarsomeres 2 and 3 have apical pale-scaled bands (nearly completely pale-scaled in some species). Adults also have a few setae on the upper proepisternum, the postpronotum has a large patch of broad scales, the postspiracular area has a few setae and normally no scales, the abdominal terga have white-scaled areas, and the maxillary palpus of males is long with the distal part of palpomere 3 slightly swollen, upturned, and bearing several long setae on the ventrolateral area, and palpomeres 4 and 5 are short and downturned. The fore- and midtarsi of males (not all species were seen) have the larger unguis with 2 teeth and the smaller unguis with 1 tooth. Numerous pale-scaled bands, spots, or both on the femora and tibiae also occur on adults of some *Diceromyia* Theobald (see Reinert 1970), *Mucidus* (see Tyson 1970b), *Aedeomyia* Theobald (see Tyson 1970a), and subgenus *Cellia* Theobald of *Anopheles* Meigen. Wings with pale-scaled patches (spots) occur in the last 3 taxa, as well as *Anopheles* subgenera *Kerteszia* Theobald and *Nyssorhynchus* Blanchard, and some *Anopheles* (*Anopheles*), *Culex* (*Culex*) Linnaeus, *Lutzia* Theobald, *Orthopodomyia* Theobald, *Psorophora* (*Grabhamia*) Theobald, and *Uranotaenia* (*Uranotaenia*) Lynch Arribalzaga (see Wilkerson and Peyton 1990). However, species of these groups differ from those of *Finlaya* in major features of all life stages.

The female genitalia of *Finlaya* are distinctive (see Reinert 2002), especially the development of tergum IX, which is composed of 2 long, narrow, lateral sclerites that are connected basally by a lightly pigmented strip and bear 1–5 short setae apically (absent in *Fl. knighti*). Also, the cercus is short with a broadly rounded or flattened apex bearing a few moderately long and long, stout setae, several short, lanceolate setae, and a number of broad scales on the dorsal surface. The upper vaginal sclerite is well developed and heavily pigmented, and both tergum and sternum VIII bear large areas covered with broad scales.

The male genitalia of *Finlaya* are very distinctive. The aedeagus is scoop-shaped with the distal

third expanded; the gonocoxite has the dorsal surface with a large patch of numerous, tightly packed setae on the basomesal area and the sternal surface has a patch of long to very long, fusiform scales on the dorsomesal margin. The claspette consists of a columnar stem usually bearing a single short seta on the proximal third, another on the distal third, and the long, apical, foliform filament normally is annulated transversely. Tergum IX consists of broad, lateral plates, each with a very small subapical lobe on the posterior margin bearing 1–3 moderately long setae. The lateral plates are connected mesally by a narrow, membranous strip. Genera *Downsiomyia* Vargas and *Haemagogus* Williston, and *Oc. albotaeniatus* (Leicester), also have long, fusiform scales on the median area of the ventral surface, but *Downsiomyia* and *Haemagogus* usually have the patch of scales extending more distad. The species of these groups also differ in the development of the aedeagus, claspette, and other features of the genitalia (male and female), adults, pupae, and 4th-stage larvae. An annulated filament of the claspette also is found in some species of the Gubernatoris and Papuensis Groups of ''*Ochlerotatus*'' *sensu auctorum,* but other features of the genitalia and other life stages of these groups are quite different from those of *Finlaya.* However, members of the Gubernatoris Group also have a group of long, broad, semierect scales posteromesally on sterna V–VII, which is similar to *Finlaya.* Contrary to the original description and illustration of *Fl. lewelleni* by Starkey and Webb (1946), the gonocoxite has a patch of long, fusiform scales on the dorsomedian margin of the sternal surface (see description and illustration in Bohart [1957: 23, 26]).

The development of the clear, unpigmented spots on the cephalothorax, abdomen, or both of pupae of *Finlaya* is distinctive within tribe Aedini, with the exception of *Alanstonea brevitibia* (Edwards) (see Reinert et al. 2004) and *Belkinius aurotaeniatus* (Edwards) (see Reinert 1982: 105). Belkin (1962: 360) discussed these clear, unpigmented spots and indicated that very similar ones occur in pupae of many New World sabethines and species of *Culex* (*Microculex*) that inhabit water in the leaf axils of plants. Belkin indicated (1962: 361) that ''the pupae usually have a distinctive color pattern of markings and iridescent spots or lines which seem to be in the nature of camouflage from predators.'' Other unusual or unique features of *Finlaya* pupae are: seta 2-II inserted mesal to or at the same level as seta 1-II, seta 5-II inserted mesal to seta 4-II, the presence of seta 8-II, seta 9-VI inserted anterior to seta 8-VI, and both setae 8,9-VII inserted dorsal and far anterior on tergum VII.

Fourth-stage larvae of *Finlaya* display a number of unusual features. For example, seta 1-C is stout proximally and the distal part is branched, usually with 2,3 branches (*Fl. ananae* with 3–5 branches). Marks (1947) noted 2–6 branches in *Fl. alocasicola,* 4–7 in *Fl. gahnicola,* and 3,4 in *Fl. wallacei*); however, Knight and Laffoon (1946) reported seta 1-C as single in *Fl. lutea* (as *aranetanus* and *flavipennis*) and *Fl. medleri,* which is atypical for *Finlaya.* Other characters reported for the immatures of these 2 species are also atypical, and because of this we believe that the association of the immature stages with the adults needs to be confirmed (these 2 species are not included in the above pupal and larval descriptions of *Finlaya*). Branched seta 1-C also occurs in 3 other aedine species: *Downsiomyia axitiosa* (Kulasekera, Knight, and Harbach), *Howardina walkeri* (Theobald), and *Stegomyia pandani* (Stone). *Tripteroides tasmaniensis* (Strickland) has seta 1-C stout and branched (see Dobrotworsky 1965), but this species differs in numerous characters of all stages from *Finlaya.* Larvae of *Finlaya* also have the following important features: seta 3-C is absent; the development and positions of setae 4–7-C are distinctive; seta 13-C is mesal to seta 12-C; seta 14-C is displaced caudally, longer than and posterior or lateral to seta 15-C; seta 2-A is noticeably longer than setae 3–6-A; seta 0-P is displaced laterally; seta 2-P is very long and single whereas setae 1,3-P are short, stellate, and multiple-branched; setae 5,10,12-M and 10-T are very long; seta 5-T is inserted mesal and slightly caudal to seta 6-T; seta 8-T is displaced anteriorly; setae 11-M,T are relatively moderately long and usually have 5 or more branches; setae 5-I–VI are large and stellate and inserted noticeably anterior to setae 6-I–VI; setae 5-III–VI are anterior to setae 8-III–VI; setae 9-II–VI are long, displaced anteriorly, and multiple-branched; the ventral brush consists of long, pectinate setae attached to a lightly to moderately pigmented boss; the development of the comb scales and pecten spines is distinctive; setae 6,8-S are both very long and single; and the spiracular apodeme of the siphon has a distinctive shape. *Aedes meronephada* (Dyar and Shannon) has setae 14,15-C, 5-I–VI, and 9-II–IV similarly developed to *Finlaya,* but this species strongly differs from *Finlaya* in other features (e.g., female and male genitalia, pupae, and adults). Larvae of genus *Lorrainea* Belkin have seta 5-I–VI slightly anterior to seta 6-I–VI but these setae are small and simple, and numerous other characters distinguish these larvae from those of *Finlaya.*

Fourth-stage larvae, pupae, and male genitalia of a number of species of *Finlaya* (as Kochi Group) are illustrated by Belkin (1962, Figs. 235–261). His illustrations should be referred to for details of these stages and structures noted above. Belkin also provided (Fig. 235) a schematic representation of the adult wing showing the distinctive light- and dark-scaled areas (see Wilkerson and Peyton [1990] for revised nomenclature of wing spots). Reinert (2002, Fig. 6) illustrated the female genitalia of the type species, *Fl. kochi.* The distinctive markings of the adult (especially legs and wings) are illustrated

in Edwards (1928b), Banez and Jueco (1966), Baisas (1974), and Russell (1996).

Lee et al. (1980, 1982) and Debenham and Hicks (1989) provide some additional citations and discussion concerning the identity of species of *Finlaya* (as the Kochi Group) occurring in the Australasian Region.

Finlaya gani (see description in Bonne-Wepster [1940]) is only provisionally included in *Finlaya*. Its placement needs to be confirmed when better adult specimens become available and the immature stages are discovered. Only 2 females (1 with paratype label) from New Guinea (in very poor condition) were available for examination. These specimens differ in several features from other species of *Finlaya,* notably in the following: fore-, mid-, and hindtarsomere 5 are dark-scaled with only 1 or 2 pale scales dorsobasally in 1 specimen; the pale scaling of all legs is reduced; the postpronotum has narrow, curved pale scales; the maxillary palpus is longer; the cercus is much longer; and the apex of tergum IX is differently developed. Bonne-Wepster (1940), in the original description, provided illustrations of the adult and male genitalia. Belkin (1962) indicated that the male genitalia also differ from the other species. Characters of *Fl. gani* are not included in the above description of the genus. This species, at a minimum, should be considered in a separate species group.

Description of *Finlaya kochi* (Dönitz), 1901

Female. *Head:* Antenna approximately 1.01 length of proboscis, flagellomere 1 with small, broad, brown scales, pedicel dark brown, with patch of small, broad, partially overlapping, white scales mesally; maxillary palpus approximately 0.27 length of proboscis, dark brown-scaled with white scales at apex; proboscis relatively short and somewhat thickened, approximately 1.03 length of forefemur, dark brown-scaled with white scales forming moderately broad band at approximately midlength and narrow, white band or small dorsal patch at apex; clypeus dark brown; eyes contiguous above antennal pedicels; ocular line narrow, with narrow, white scales; several dark brown ocular setae; 2 long and occasionally 2 moderately long golden interocular setae; vertex with narrow, curved, white scales forming median patch, patch broader anteriorly and narrower posteriorly, occasionally 1–3 broad, white scales at lateral margins of patch, large patch of broad, dark brown, decumbent scales on each side laterally with several long, dark brown, semierect, forked scales intermixed; postgena dark brown-scaled, with broad white scales forming elongate patch anterior to antepronotum and smaller lower patch anteroventrally; occiput with several narrow, white, decumbent scales and numerous dark brown, erect, forked scales. *Thorax:* Scutal integument dark brown, covered with narrow, curved scales except for bare median, prescutellar area and small, elongate area on each side between lateral part of prescutellar area and posterior supraalar area, background scales dark brown, white scales as follow: small patch on anterior promontory extending short distance posteriorly and curved back anteriorly onto antedorsocentral area (some specimens with few brown scales immediately posterior to white-scale patch on anterior promontory), scales forming indistinct stripe on anterior acrostichal area and connected with patch on anterior promontory (stripe more defined in some specimens), small indistinct patch between acrostichal and dorsocentral setae at approximately midlength, scattered scales forming indistinct pattern extending posteriorly along outer margins of acrostichal area lateral to setae to near prescutal suture, short narrow line (about 2 scales wide) on inner margin of posterior dorsocentral area, small patches on margin of scutal fossa anteriorly and laterally, elongate, narrow, patch posterior to prescutal suture extending from outer margin of antealar area mesal to posterior dorsocentral area where it angles posteriorly to point anterior of prescutellar setae, small patch on supraalar area, and scales forming narrow line on lateral margins of prescutellar bare space and meeting with moderate-sized patch on anterior margin, also scales forming narrow, transverse band near midlength, some specimens with white-scaled patches on median dorsal areas of scutum with fewer scales and less distinct; dark brown setae as follow: few anterior promontory, several acrostichal (anterior and posterior), few antedorsocentral, several dorsocentral (anterior and posterior), few scutal fossal (anterior, lateral, and posterior), few antealar, several supraalar (long except small patch of short ones anterior to wing base), several short, fine, posterior median scutal, numerous prescutellar, and 1 short parascutellar; scutellum with broad, white scales on lateral lobes that extend over space between lateral and median lobe, median lobe with broad brown scales, broad and few narrow, curved white scales basally and basolaterally, several long and few short, dark brown setae on each lobe; mesopostnotum dark brown; pleural integument dark brown; antepronotum with broad, white scales, lower ones longer, several dark brown setae; postpronotum with large patch of broad scales, white except for brown ones along dorsal margin and small, posterodorsal area, 2,3 dark brown posterior setae; postspiracular area with 3–5 dark setae; subspiracular area with small, dorsal patch of small, moderately broad, white scales and small, elongate, posterior patch of similar scales; upper proepisternum with patch of broad, white scales, 3,4 setae, lower area bare; paratergite with elongate patch of broad, white scales on lateral margin; prealar area with broad, white scales on upper and lower areas, 7–10 setae on upper area; mesokatepisternum with upper and lower patches of broad, white scales, 1 upper and several lower setae posteriorly; mesepimeron

with upper patch of broad, white scales, 8–11 upper setae; other pleural areas bare. *Legs:* Forecoxa with broad, white scales dorsally and small patch ventrally separated by large, brown-scaled patch, several setae; midcoxa with patch of broad, white scales on dorsal area and patch of broad, brown scales below, several setae; hindcoxa with lower patch of broad, dark brown scales, several setae; fore-, mid-, and hindtrochanters with broad, dark brown scales, few short, brown setae; fore-, mid-, and hindfemora dark brown-scaled with narrow, white-scaled bands at base and apex, and 5 narrow bands interspersed between these, often with additional 1 or 2 incomplete bands or spots, several long, semierect, brown scales subapically on ventral surface, mid- and hindfemora usually with subbasal band wider; fore-, mid- and hindtibiae dark brown-scaled with white scales forming dorsobasal spot, narrow apical band, and 4 narrow bands interspersed, often with 1 or 2 additional incomplete bands; foretarsus dark brown-scaled, tarsomere 1 with white scales forming small, dorsobasal spot or band, small dorsal spot or narrow band at midlength and wide apical band, tarsomere 2 with small, dorsoapical white spot or narrow band, tarsomeres 3 and 4 brown-scaled, tarsomere 5 white-scaled; mid- and hindtarsi brown-scaled, tarsomere 1 with broad, white-scaled bands at base, midlength, and apex, tarsomere 2 with broad, apical, white-scaled band, tarsomere 4 brown-scaled, tarsomere 5 white-scaled; midtarsomere 3 brown-scaled; hindtarsus with tarsomere 3 with broad, apical, white-scaled band; fore- and midtarsi with 2 ungues equal in size, each with 1 tooth, hindtarsus with 2 ungues equal in size, both simple. *Wing:* Dorsal surface of veins with broad, dark brown scales and numerous small patches of broad, white scales, very slight variation in size of white-scaled areas noted; white-scaled spots as follow (for anterior veins, nomenclature used follows Wilkerson and Peyton [1990]): costa with minute basal pale, small humeral pale, small sector pale, small subcostal pale, and small apical pale; subcosta with small sector pale, small subcostal pale, minute apical pale; radius with small humeral pale, small sector pale, small accessory sector pale, small subcostal pale, small preapical pale, and small apical pale; R_{2+3} with minute subapical pale and minute pale at fork of R_2 and R_3; R_2 with small apical pale; R_3 with small subapical pale and small apical pale; R_{4+5} with small basal pale, small subapical pale and minute apical pale; M with small basal pale, small subbasal pale to fork, small pale at intersection of rmc, and small pale at intersection of R_{3+4}; M_{3+4} with small subbasal pale and small apical pale; Cu with small basal pale, small pale subbasal to fork, and small pale distal to fork of Cu and M_{3+4}; 1A with moderate basal pale and minute apical pale; wing fringe on posterior margin with small patches of white scales at termination of M_1, M_2, M_{3+4}, Cu, and 1A; R_2 longer than R_{2+3}; remigial setae absent; alula with several, narrow, dark brown scales on posterior margin; halter with pedicel pale, capitellum with broad, dark brown scales. *Abdomen:* Terga with broad, dark brown scales and white-scaled areas, with several moderately long setae on lateral and posterior margins; tergum I with laterotergite white-scaled; terga II,VI,VII with dorsobasal, white-scaled patch, III–V occasionally with small, white-scaled patch basally, II–VII each with pair of small, more or less square, white-scaled patches subapically, VII occasionally with white-scaled patches connected and extending to posterior margin, lateral surface of II–VII with narrow, white-scaled line extending from base and curved dorsally but not reaching posterior or dorsal surfaces; sterna II–VI with broad scales, white scales forming basal band, band broad mesally and narrow laterally, lateral areas dark brown-scaled; sterna II–IV with small to moderate-sized, median, white-scaled patch subapically; sterna V–VII with patch of long, moderately broad, dark brown, semierect scales on posteromesal area.

Female genitalia. *Tergum VIII:* Covered with minute spicules; proximal 0.40–0.60 retracted into segment VII; moderately pigmented; moderately long; width greater than length; apex broadly convex; base slightly concave; numerous broad, spatulate scales covering distal 0.61–0.74, scales dark except for pale ones forming large, median patch proximally, and usually few along lateral margins; several long, stout setae apically and few short and moderately long setae scattered over distal 0.41–0.48; basolateral seta absent; VIII-Te index 0.61–0.71; VIII-Te/IX-Te index 1.85–2.24; length 0.25–0.31 mm; width 0.42–0.46 mm. *Sternum VIII:* Covered with minute spicules; moderately pigmented, lateral areas slightly darker; width greater than length; apex and base both nearly straight; apex wider than base; numerous dark, broad, spatulate scales covering most of lateral areas on distal 0.84–0.94, few pale, broad, spatulate scales on lateral and apical margins; apical margin with number of short, curved, lanceolate setae, few short setae with distal portions curved and 2,3 moderately long, straight setae on apicolateral corners; numerous short and few long and moderately long setae on distal 0.87–0.94; basolateral seta absent; apical, intersegmental membrane nonpigmented; intersegmental membrane between segments VII and VIII moderately long; VIII-S index 0.72–0.84, length 0.32–0.36 mm, width 0.43–0.46 mm. *Tergum IX:* Covered with minute spicules, those along apical margins longer; moderately pigmented; composed of 2 long, narrow, lateral sclerites connected basally by lightly pigmented strip; each sclerite with 1,2 apical setae, 2–4 total setae; IX-Te index 1.13–1.44; length 0.13–0.15 mm; width 0.10–0.12 mm. *Insula:* Covered with minute spicules; moderately pigmented; short, wide, liplike; 2 long, slender setae laterally on each side of midline, 4 total setae. *Lower vaginal lip:* Covered with minute spicules;

moderately pigmented; moderately wide; lower vaginal sclerite absent. *Upper vaginal lip:* Covered with short spicules; moderately pigmented; moderately wide; upper vaginal sclerite large, heavily pigmented. *Spermathecal eminence:* Membranous; somewhat diamond-shaped in outline; few short, simple, spermathecal eminence spicules on median, basal area. *Postgenital lobe:* Covered with short spicules, those on lateral margins longer; short, relatively narrow, apex rounded; basal mesal apodeme moderately long, narrow, darkly pigmented; 3–7 distal setae on each side of midline, 6–14 total setae; ventral PGL/Ce index 0.64–0.71; dorsal PGL index 0.95–1.11; ventral PGL index 2.00–2.15; ventral length 0.11–0.12 mm. *Proctiger:* With minute spicules in small groups; membranous. *Cercus:* Covered with minute spicules; short, broad; apex broad, flat; apical margin with 4,5 long, stout setae, several short, curved, lanceolate setae, and several short setae with distal portions curved; dorsal surface with numerous pale, broad, spatulate scales on distal 0.42–0.62, 2 long setae on approximately distal 0.15, and number of short setae on distal 0.35–0.65; ventral surface with few short setae near apical and mesal margins; cercus index 1.74–1.83; Ce/dorsal PGL index 2.56–3.10; length 0.16–0.18 mm; width 0.09–0.10 mm. *Spermathecal capsules:* One large and 2 slightly smaller; heavily pigmented. *Accessory gland duct:* Base moderately pigmented, moderately long.

Male. Like female except as follows. *Head:* Antenna approximately 0.78 length of proboscis; maxillary palpus long, approximately 1.14 length of proboscis, dark brown-scaled with white-scaled areas as follow: palpomere 2 with subbasal and apical narrow bands, palpomere 3 with narrow bands near midlength and subapically, apex fringed, palpomere 4 with narrow band basally, apex fringed; proboscis approximately 1.18 length of forefemur; vertex with few broad, white scales along lateral and posterior margins of median white-scaled patch of narrow scales. *Thorax:* Scutum with white-scaled areas usually better defined; postpronotum with reduced number of broad, brown scales. *Legs:* Fore- and midtarsi each with 2 ungues unequal in size, larger unguis with 2 teeth, smaller unguis with 1 tooth, hindtarsus with 2 ungues equal in size, both simple. *Abdomen:* Terga II–VII with lateral white-scaled, curved line reduced in size, reduced to small, subapical spot on IV–VII; sterna with white-scaled areas reduced in size.

Male genitalia. *Tergum IX:* Covered with minute spicules; moderately pigmented; composed of 2 lateral, moderately large plates with posterior margins sloping cephalad to narrow, median, membranous connection between plates, very small, heavily pigmented lobe submedially on posterior margin of each plate bearing 1,2 moderately long, slender to moderately stout, curved setae. *Gonocoxite:* Covered with minute spicules; moderately pigmented; distal part relatively narrow and basal part moderately wide; dorsal surface with large, elongate patch of moderately long, lanceolate setae on basomesal area, proximal setae longer and stouter, distal setae more slender and curved, most distal setae less lanceolate, single long, curved, specialized seta with proximal and distal parts narrow, median area expanded and flattened, and attached to tubercle inserted ventromesally near midlength of patch of lanceolate setae, several moderately long, slender setae on mesal and distal areas, 1,2 long, stout setae at apex; lateral surface with several moderately long to long, stout setae extending from near base to near apex; ventral surface with mesal margin subapically slightly expanded forming small flap bearing elongate patch of numerous, short, relatively narrow, fusiform scales and few short setae, patch of about 12–16 long to very long, broad, fusiform scales (scales decreasing in length proximally), inserted immediately ventrad of approximately basal half of elongate patch of short fusiform scales, remainder of area with several short setae near median part of basal 0.50 and 2,3 long, stout setae apically; dorsal, lateral, and ventral surfaces largely covered with long, broad, dark scales. *Gonostylus:* Moderately long, approximately 0.44 of gonocoxite length; narrow but slightly swollen at about 0.46 from base; 1 minute, slender seta subapically on mesal surface; gonostylar claw attached at apex of gonostylus, darkly pigmented, long, approximately 0.50 of gonostylar length, slender, with distal part slightly curved, apex blunt. *Claspette:* Moderately pigmented; basal part and proximal and distal areas of stem with small spicules; stem columnar, narrow, slightly curved, with 1 minute seta on distal 0.25 and 1 on proximal 0.25; filament long (longer than stem), slightly curved, annulate (much of length with numerous, transverse, narrow rings), proximal area approximately same width as apex of stem, middle third broader with pale, flattened flap, distal third narrowing to blunt point; aedeagal guide heavily pigmented, moderately long, troughlike. *Proctiger:* Paraproct narrow, heavily pigmented, terminating in 3 closely lying teeth that form short, curved, beaklike apex; cercus membranous, 1 minute cercal seta on each side subapically. *Tergum X:* Heavily pigmented; narrow, curved dorsomesad and extending below posterior margin of tergum IX to base of very small lobe. *Phallosome:* Aedeagus moderately pigmented, scooplike, short, approximately distal third expanded and wider than remainder; paramere heavily pigmented, very slightly shorter than aedeagal length, narrow; basal piece heavily pigmented, relatively short (less than aedeagal length). *Sternum IX:* Covered with minute spicules; moderately pigmented on lateral, basal, and median areas, remainder lightly pigmented; moderately long; 2,3 moderately long setae on posteromedian area.

Pupa. *Cephalothorax:* Lightly pigmented with area mesal to trumpets moderately pigmented and bearing small, elongate, clear, unpigmented spot

with irregular margins located near midline posteriorly; seta 1-CT very long, stout, with 2 branches; 2-CT moderately long, slender, with 2–4 branches; 3-CT moderately long, slender, with 2,3 branches, 3-CT slightly longer than 2-CT; 4-CT moderately long, slender, with 3–6 branches; 5-CT moderately long, slender, with 4–6 branches; 6-CT short, with 2 branches; 7-CT long, with 2–6 branches (single on 1 side of 1 specimen); 8-CT moderately long, slender, single or 2-branched; 9-CT moderately long, slender, with 2,3 branches; metanotum mostly moderately pigmented with some lighter pigmented areas, with small, oval, clear, unpigmented spot near lateral margin; 10-CT moderately long, slender, with 4–7 branches; 11-CT long, stout, single; 12-CT long, slender, with 5–7 branches; 11-CT > 12-CT > 10-CT length. *Trumpet:* Relatively short with apex broad; moderately pigmented; index 3.05–3.44; pinna 0.25–0.34 of trumpet length. *Abdomen:* Terga I,II and basal area of III mostly moderately pigmented; terga and sterna II–VIII covered with numerous small spicules; puncture on terga III–V inserted anterolateral to seta 4-III, anteromesal to 4-IV, posterolaterad of 4-V; sterna II–VI each with transverse ridge subbasally; seta 1-I moderately long, fanlike, with multiple, brush-tipped branches; 2-I short, moderately stout, single; 3-I very long, stout, single; 4-I short, slender, with 5,6 branches; 5-I short, slender, with 4–6 branches; 6-I very long, single or 2-branched; 7-I moderately long, with 3,4 branches; 9-I short, slender, single; 11-I short, single to 3-branched; 0-II minute, single; 1-II short, slender, with 2,3 branches; 2-II short, moderately stout, single, anteromesal to 1,3-II; 3-II very long, stout, single; 4-II short, slender, with 2–4 branches; 5-II moderately long, with 2–4 branches, mesal to 4-II; 6-II moderately long, slender, with 2 branches, 6-II longer than 7-II; 7-II moderately long, slender, with 2–4 branches; 8-II short, slender, with 2–4 branches, inserted far anteriorly; 9-II short, single, anteroventral to 6,7-II; 10-II absent; 11-II short, slender, single; 0,14-III minute, single; 1-III short, slender, single to 4-branched; 2-III short, moderately stout, single, inserted anterior and slightly mesal to 1-III; 3-III long, approximately equal to tergum IV length, stout, single; 4-III short, slender, with 3–5 branches, inserted lateral to 5-III; 5,6-III moderately long, slender, with 2,3 branches; 7-III short, slender, with 2–5 branches; 8-III short, slender, with 3–5 branches; 9-III short, moderately stout, single; 10-III moderately long, slender, single to 3-branched; 11-III short, slender, single; 0,14-IV minute, single; 1,6-IV short, slender, with 2,3 branches; 2-IV short, moderately stout, single, inserted anteromesal to 1-IV; 3-IV short, slender, with 2–5 branches; 4-IV short, slender, with 2–4 branches; 5-IV very long, noticeably longer than tergum V, stout, with 2 branches; 7-IV short, slender, with 3,4 branches; 8-IV short, slender, with 4–6 branches; 9-IV short, moderately stout, single; 10-IV moderately long, slender, single or 2-branched; 11-IV short, slender, single; 0,14-V minute, single; 1-V short, slender, with 2,3 branches; 2-V short, moderately stout, single, inserted anteromesal to 1-V; 3-V moderately long, slender, with 2,3 branches; 4,7-V short, slender, with 2–4 branches; 5-V very long, noticeably longer than tergum VI, with 2 branches; 6-V short, slender, with 2 branches; 8-V short, slender, with 4,5 branches; 9-V short, moderately stout, single; 10-V moderately long, slender, single; 11-V short, slender, single; 0,14-VI minute, single; 1-VI short, slender, single to 3-branched; 2-VI short, moderately stout, single, inserted anterior and slightly mesal to 1,3-VI; 3-VI short, slender, inserted anteriorly and in line with 1-VI; 4-VI short, slender, with 2–4 branches; 5-VI very long, noticeably longer than tergum VII, with 2 branches; 6-VI short, slender, with 2 branches; 7-VI long, slender, single to 4-branched; 8-VI short, slender, with 2–5 branches; 9-VI short, moderately stout, single, inserted anterolateral to 8-VI; 10-VI moderately long, slender, single or 2-branched; 11-VI short, slender, single; 0,14-VII minute, single; 1-VII short, slender, single to 3-branched; 2-VII short, moderately stout, inserted anterior and in line with 1-VII; 3-VII short, slender, single or 2-branched; 4,7-VII moderately long, slender, with 2 branches; 5-VII short, slender, with 2–4 branches; 6-VII short, slender, with 2,3 branches, inserted posteromesal to 9-VII near posterior margin of tergum; 8-VII short, slender, with 2–6 branches, inserted far anteriorly on tergolateral surface; 9-VII moderately long, moderately stout, with 3,4 branches, inserted far anteriorly; 10-VII moderately long, slender, single or 2-branched; 11-VII short, slender, single or 2-branched; 0,14-VIII short, single; 4-VIII moderately long, slender, single or 2-branched; 9-VIII fanlike, long, stout, with 11–14 branches. *Paddle:* Broadly ovoid; with shallow, median, apical emargination; short, stout spicules on outer margin except basal area and approximately proximal 0.50 of inner margin; index 1.28–1.37; male genital lobe index 1.14–1.17; midrib extending to near apex; seta 1-Pa short, slender, single.

Fourth-stage larva. *Head:* Seta 1-C stout proximally, with 2 branches; 4,6-C moderately long, inserted far anteriorly; 4-C with 2 branches, mesal to 6-C; 5-C long, single, inserted posterior to 4,6,7-C, slightly mesal to 6-C and lateral to 4-C; 6-C with 2 branches; 7-C moderately long, stellate, with 5–9 branches, inserted lateral to 4–6-C, posterior to 4,6-C and anterior to antennal base; 8-C short, slender, single or 2-branched; 9-C short, slender, with 2–4 branches; 10-C moderately long, slender, single; 11-C short, stellate, with 6–8 branches; 12-C short, slender, with 2 branches, inserted lateral to 13-C; 13-C moderately long, slender, single; 14-C moderately long, stellate, with 6,7 branches; 15-C short, slender, with 4–6 branches; 18-C short, single; labiogula short and wide. *Mouthparts:* Seta 6-Mx short, stellate, with 8–14 branches; lateral palatal brush with comb-tipped filaments, dorso-

mentum with 21 short teeth. *Antenna:* Seta 1-A single, inserted 0.31–0.34 from apex of shaft. *Thorax:* Setae 5-P, 6-P, 7-P, 5-M, 7-T each inserted on moderately pigmented, small tubercle, 9–12-P, 6–7-M, 9–12-M, and 9–12-T inserted as groups on moderately pigmented, larger tubercles; 0-P short, stellate, with 9,10 branches; 1,3-P moderately long, stellate, multiple-branched; 2-P very long, single; 1–3-P on moderately pigmented, common setal support plate; 4-P short, slender, with 2,3 branches; 5-P moderately long, stellate, multiple-branched; 6-P long, single; 7-P long, with 2,3 branches; 5-P < 6-P < 7-P length; 8-P relatively short, stellate, multiple-branched; 9,10-P short, stellate, multiple-branched; 11-P short, slender, single or 2-branched; 12-P very long, single; 14-P short, with 2 stiff branches; 1-M moderately long, stellate, with 8–10 branches; 2-M short, slender, single; 3,7-M long, moderately stout, single; 4-M short, slender, with 2 branches; 5-M very long, stout, single, noticeably longer than 7-M; 6-M long, aciculate, with 6,7 branches; 8-M long, aciculate, multiple-branched; 9-M long, moderately stout, multiple-branched; 10,12-M very long, stout, single, 10-M slightly longer than 12-M; 11-M short, stellate, with 3,4 branches; 14-M short, stellate, with 6,7 branches; 1-T moderately long, stellate, with 6,7 branches; 2,6-T moderately long, single; 3-T short, stellate, with 5–7 branches, inserted anterior and slightly mesal to 5-T; 4-T short, slender, with 3 branches; 5-T short, stellate, with 8,9 branches, mesal and slightly posterior to 6-T; 7-T long, aciculate, with 6–13 branches; 8-T short, stellate, with 5–8 branches; 9-T long, moderately stout, with 5,6 branches; 10-T very long, stout, lightly aciculate, single; 11-T short, stellate, with 3–5 branches; 12-T short, slender, single, approximately 1.5× length of 11-T; 13-T short, stellate, with 14–18 branches. *Abdomen:* Setae 1,2,4,5,9,11,13-I stellate, multiple-branched, but 4,9-I with only 3,4 branches; 3,12-I single; 6-I long, stout, lightly aciculate, with 5 branches; 7-I long, single; 10-I short, slender, with 2,3 branches; 0-II minute, single; 1,2,5,9,13-II stellate, multiple-branched; 3,8,10-II single; 4-II short, slender, with 2–4 branches; 6-II long, stout, lightly aciculate, with 5,6 branches; 7-II moderately long, single or 2-branched; 8-II inserted anteroventral to 5-II; 11,12-II short, slender with 2,3 branches; 0,14-III minute, single; 1,2,5,7,9,13-III stellate, multiple-branched; 3,8,10-III single; 4-III short, slender, with 2–4 branches; 6-III long, stout, lightly aciculate, with 2 branches; 6-III > 6-II length; 11,12-III short, slender, with 2,3 branches; 0,14-IV minute, single; 1,2,5,7,9,13-IV stellate, multiple-branched; 3,10-IV single or 2-branched; 4,11,12-IV short, slender, with 3,4 branches; 6-IV long, stout, lightly aciculate, with 2 branches; 8-IV single; 0,14-V minute, single; 1,2,5,7,9,13-V stellate, multiple-branched; 3,8-V long, single; 4-V with 2,3 stiff branches; 6-V long, stout, lightly aciculate, with 2 branches; 10,12-V moderately long, slender, single; 11-V short, slender, with 2,3 branches; 0,14-VI minute, single; 1,2,5,7,9,13-VI stellate, multiple-branched; 3,4,8-VI short, slender, with 2,3 branches; 6-VI long, stout, lightly aciculate, with 2 branches; 10-VI short, slender, with 4 branches; 11-VI short, slender, with 2 branches; 12-VI moderately long, slender, single; 0,14-VII minute, single; 1,2,5,6,8,9,10,13-VII stellate, multiple-branched; 3,4,7,12-VII single; 11-VII short, slender, single to 3-branched; 0-VIII minute, single; 1,5-VIII stellate, multiple-branched; 2,4-VIII single; 3-VIII moderately long, aciculate, with 3 branches; comb with 51–76 scales in triangular patch, scales in caudal row long, bladelike with pointed apex and subbasal, short, stout, curved, clawlike spicule laterally on each side, numerous short, flattened, apically rounded scales with short spicules along margins in remainder of patch; segment X with dorsal saddle moderate in size, moderately pigmented, incomplete ventrally, acus absent, covered with short spicules, with patch of moderately stout, long spicules on posterior margin ventral to setae 2,3-X and dorsal to seta 1-X, patch of similar scales below seta 1-X on posterior margin; 1-X very long, stout, aciculate, with 2 branches; 2-X long, with 4,5 branches; 3-X very long, stout, single; ventral brush with 10 long setae, stems long and slender (except anterior 1 or 2 setae shorter with shorter stems), lightly pectinate with 3–5 long, slender branches, attached ventrally to small, lightly pigmented boss; 4 anal papillae, relatively long, broad, with apices bluntly pointed, dorsal 2 papillae slightly longer than ventral 2. *Siphon:* Moderately pigmented; covered with short spicules; acus absent; index (dorsal length to width at midlength) 2.30–2.58; pecten on proximal 0.46–0.50 of siphon, composed of 10–13 (usually 10 or 11) evenly spaced, long, narrow, pointed spines with minute spicules along ventral margin from near base to apex, basal 1,2 spines often shorter (2 specimens with 20–23 spines on one side, 8,9 of which were smaller and in small patch at base of row, other side with 11–13 spines); seta 1-S moderately long, aciculate, with 2,3 branches, inserted distal to pecten; 2-S short, single; 6,8-S long, single; 7,9-S short, single.

Type data. Dönitz (1901), in his original description (p. 38, written in German) of the adult female of ''*Culex Kochi,*'' did not mention a type or type depository nor the number of specimens that comprise the type series. He did indicate that the ''Habitat'' was ''Neu-Guinea'' and the male was unknown. Theobald (1901: 318), while working at the British Museum (Natural History), included the following in his description of ''*Culex* (?) *Kochi* Donitz'': ''Described from a somewhat damaged specimen sent me by Dr. Donitz, who has described the ♀ from New Guinea. The ♂ is unknown.'' Blanchard (1905: 515) selected ''*Finlaya Kochi* (Dönitz)'' as the type species for genus *Finlaya* but did not provide any information concerning the type specimen or series. Marks (1947: 10)

indicated that Dr. Smart stated ''the collections made by Donitz are supposed to have been deposited in the Zoological Museum at Berlin'' and consequently designated a male as the allotype of *kochi*. However, the designation is invalid because the specimen was not part of the type series (see above). Knight and Marks (1952: 544) reported that the holotype female is in the Zoological Museum, Berlin, and that it bears a label inscribed ''Dreyer Hafen b. Cap Cretin. 3.4.00.'' Stone et al. (1959: 165) and Knight and Stone (1977: 98) subsequently recorded the type locality as ''Dreyer Hafen b. Cap Cretin, New Guinea'' and the Zoologisches Museum der Humboldt Universitat, Berlin, as the type depository. Townsend et al. (1990: 91) reported that a syntype female of the species is deposited in the British Museum (Natural History), currently the Natural History Museum (NHM), and provided the following information ''Syntype-Papua New Guinea: 1 female, Dreyer Hafen b. Cap. Cretin [6°40′S 147°53′E]. Valid species of *Aedes* (*Finlaya*). The head is glued on a card mount; the body now with it was found in the drawer immediately under the mount, and there is thus some doubt about its association.'' A letter dated 26.5.1992 from Dr. H. Schumann, Zoologisches Museum, Museum fur Naturkunde der Humboldt-Universitat zu Berlin, to one of us (R.E.H.) in response to an inquiry about the type of *Aedes kochi*, indicated that specimens of *Anopheles kochi* Dönitz but not *Aedes kochi* Dönitz are in the collection. The female syntype specimen in the Natural History Museum was examined by one of us (J.F.R.) in 1993. It is mounted on a pin that bears 4 labels inscribed ''Cul. Kochi Do.'' (small white paper rectangular label handwritten in black ink)//''PARA-LECTOTYPE'' (small circular white paper label with blue border) //''Dreyer Hafen. b. Cap. Cretin. 3.4.00'' (small white paper rectangular label handwritten in black ink)//''thorax/abdomen on slat under mount ix.85 det. B.C. Townsend, 1986'' (white paper rectangular label handwritten except last line printed). The specimen is in poor condition. The head is glued to a paper point attached to the insect pin. The thorax (with right wing extended, left wing covered in glue and legs missing), and abdomen are pinned (with a minuten nadeln) to a polyporous block attached to the insect pin. Because the type specimens in the Zoologisches Museum (see above) are apparently lost and no other material from the type series is known to exist, we hereby select and label the remaining syntype female in the Natural History Museum (NHM) as the neotype as per Article 75.1 of the *International Code of Zoological Nomenclature* (International Commission on Zoological Nomenclature 1999).

Bionomics. Marks (1947) listed the habitat of immatures of *Fl. kochi* as water in leaf axils of banana, taro, cunjevoil, pineapple, crinum, and *Pandanus*. Australian wild turmeric (*Curcuma australasica*) was included by Marks (1958) as an additional habitat of immatures of *Fl. kochi*. Females readily bite humans in parts of New Guinea and were taken biting in the late afternoon in southern Queensland, Australia (Marks 1947). Marks also cited Taylor (1943, reference not included here), who stated that this species can be a persistent biter during the day and night, and Heydon (1931, reference not included here), who reported this species as a night-biting pest in Rabaul.

Discussion. The above description of *Fl. kochi* is based on the neotype female (see above), and 7 females, 3 female genitalia, 12 males, 5 male genitalia, 5 pupal exuviae, 3 larval exuviae, and 4 fourth-stage larvae from New Guinea deposited in the National Museum of Natural History, Washington, DC.

Published illustrations of *Fl. kochi* include the following: the male genitalia, pupa, and larva (in part) (Marks 1947), the pupa (abdomen) (Penn 1949), and the female genitalia (Reinert 2002). Four photographs of adult females from southeastern Australia published in Russell (1996) display several small differences from characters observed in specimens examined from New Guinea, especially in the wing and leg patterns. These illustrations show many of the distinctive features of genus *Finlaya*.

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